

CLAIMS

What is claimed is:

- 1 1. A front-end server comprising:
2 a cache memory for holding at least one operation request directed from a client device
3 to a NAS (Network Attached Storage) server, the client device and the NAS server being coupled
4 via the front-end server;
5 a client operation processing unit for receiving said at least one operation request from
6 the client device, the client operation processing unit also being capable of performing an
7 operation based on said at least one operation request by using cache data stored in the cache
8 memory; and
9 a data change reflection processing unit for creating at least one operation sequence, the
10 created at least one operation sequence being a result of an operation performed by the client
11 operation processing unit in response to the received at least one operation request from the
12 client device, the data change reflection processing unit also being capable of transmitting the
13 created at least one operation sequence to the NAS server.
- 1 2. The front-end server of claim 1, wherein, in response to a determination that multiple
2 operation requests from the client device are compatible for merging, the client operation
3 processing unit synthesizes a plurality of the operation requests received from the client device
4 into one combined operation request, and the client operation processing unit executes the
5 combined operation request using the cache data in the front-end server to create the created at
6 least one operation sequence.
- 1 3. The front-end server of claim 2, wherein the created at least one operation sequence sent
2 to the NAS server is a directive to directly change data stored in the NAS server, the directive
3 based on results of the client operation processing unit executing the combined operation request
4 using data in the cache memory in the front-end server.

1 4. The front-end server of claim 1, wherein in response to a determination that multiple
2 operation requests from the client device are compatible for merging, the client operation
3 processing unit synthesizes a plurality of the operation requests received from the client device
4 into one combined operation request, and wherein the created operation sequence sent to the
5 NAS server is the combined operation request to be executed by the NAS server using data
6 stored in the NAS server.

1 5. The front-end server of claim 4, wherein the series of instructions are pipelined when
2 sent to the NAS server for parallel execution.

1 6. The front-end server of claim 1, wherein the cache memory is a non-volatile recording
2 medium.

1 7. The front-end server of claim 1, wherein the front-end server is one of a plurality of
2 front-end servers coupled to the NAS server via the Network File System (NFS) protocol.

1 8. A network system comprising:
2 a client device;
3 a Network Attached Storage (NAS) server, and
4 a front-end server coupling the client device and the NAS server, the front-end server
5 comprising:

6 a cache memory for holding at least one operation request directed
7 from the client device to the NAS (Network Attached Storage) server;

8 a client operation processing unit for receiving said at least one
9 operation request from the client device, the client operation processing unit
10 also being capable of performing an operation based on said at least one
11 operation request by using cache data stored in the cache memory; and

12 a data change reflection processing unit for creating at least one
13 operation sequence, the created at least one operation sequence being a result of

14 an operation performed by the client operation processing unit in response to
15 the received at least one operation request from the client device, the data
16 change reflection processing unit also being capable of transmitting the created
17 at least one operation sequence to the NAS server.

1 9. The network system of claim 8, wherein, in response to a determination that multiple
2 operation requests from the client device are compatible for merging, the client operation
3 processing unit synthesizes a plurality of the operation requests received from the client device
4 into one combined operation request, and the client operation processing unit executes the
5 combined operation request using the cache data in the front-end server to create the created at
6 least one operation sequence.

1 10. The network system of claim 9, wherein the created at least one operation sequence sent
2 to the NAS server is a directive to directly change data stored in the NAS server, the directive
3 based on results of the client operation processing unit executing the combined operation request
4 using data in the cache memory in the front-end server.

1 11. The network system of claim 8, wherein in response to a determination that multiple
2 operation requests from the client device are compatible for merging, the client operation
3 processing unit synthesizes a plurality of the operation requests received from the client device
4 into one combined operation request, and wherein the created operation sequence sent to the
5 NAS server is the combined operation request to be executed by the NAS server using data
6 stored in the NAS server.

1 12. The network system of claim 11, wherein the series of instructions are pipelined when
2 sent to the NAS server for parallel execution.

1 13. The network system of claim 8, wherein the cache memory is a non-volatile recording
2 medium.

1 14. The network system of claim 8, wherein the front-end server is one of a plurality of
2 front-end servers coupled to the NAS server via the Network File System (NFS) protocol.

1 15. A method comprising: ✓

2 holding, in a cache memory in a front-end server, at least one operation request directed
3 from a client device to a NAS (Network Attached Storage) server, the client device and the NAS
4 server being coupled via the front-end server;

5 receiving, at a client operation processing unit in the front-end server, said at least one
6 operation request from the client device;

7 performing, in the client operation processing unit, an operation based on said at least
8 one operation request by using cache data stored in the cache memory;

9 creating, in a data change reflection processing unit in the front-end server, at least one
10 operation sequence, the created at least one operation sequence being a result of an operation
11 performed by the client operation processing unit in response to the received at least one
12 operation request from the client device; and

13 transmitting, by the data change reflection processing unit, the created at least one
14 operation sequence to the NAS server.

1 16. The method of claim 15, wherein, in response to a determination that multiple operation
2 requests from the client device are compatible for merging, the client operation processing unit
3 synthesizes a plurality of the operation requests received from the client device into one
4 combined operation request, and the client operation processing unit executes the combined
5 operation request using the cache data in the front-end server to create the created at least one
6 operation sequence.

1 17. The method of claim 16, wherein the created at least one operation sequence sent to the
2 NAS server is a directive to directly change data stored in the NAS server, the directive based on
3 results of the client operation processing unit executing the combined operation request using
4 data in the cache memory in the front-end server.

1 18. The method of claim 15, wherein in response to a determination that multiple operation
2 requests from the client device are compatible for merging, the client operation processing unit
3 synthesizes a plurality of the operation requests received from the client device into one
4 combined operation request, and wherein the created operation sequence sent to the NAS server
5 is the combined operation request to be executed by the NAS server using data stored in the NAS
6 server.

1 19. The method of claim 18, wherein the series of instructions are pipelined when sent to
2 the NAS server for parallel execution.

1 20. The method of claim 15, wherein the cache memory is a non-volatile recording medium.